

Patent claims

1. A brake control system for a vehicle, in  
5 particular a commercial vehicle, (**combination of  
original claims 1 + 2 + 15**)
- the vehicle (1) comprising at least one front axle  
(2) with at least one left-hand front wheel (4)  
and at least one right-hand front wheel (5),
  - 10 - the vehicle (1) comprising at least one rear axle  
(3) with at least one left-hand rear wheel (6) and  
at least one right-hand rear wheel (7),
  - a service brake (8) being provided for braking the  
wheels (4 to 7) of the vehicle (1),
  - 15 characterized
  - in that the service brake (8) is provided
  - - with at least one electronically actuatable  
front left-hand brake unit (9) for actuating  
braking of the at least one left-hand front  
20 wheel (4),
  - - with at least one electronically actuatable  
front right-hand brake unit (10) for actuating  
braking of the at least one right-hand front  
wheel (5),
  - 25 - - with at least one electronically actuatable  
rear left-hand brake unit (11) for actuating  
braking of the at least one left-hand rear  
wheel (6),
  - - with at least one electronically actuatable  
30 rear right-hand brake unit (12) for actuating  
braking of the at least one right-hand rear  
wheel (7),
  - in that a first central control device (13) is  
provided, which is connected via at least one  
35 control line (14 to 17) to the brake units (9 to  
12) in such a way that it can actuate the brake  
units (9 to 12) independently of one another,

- in that a second central control device (18) is provided, which is connected to the first control device (13) and/or with the at least one control line (14 to 17), and connected redundantly to the first control device (13),  
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- in that two front control lines (14, 15) are provided for actuating the brake units (9, 10) associated with the front axle (2), of which at least the first control line (14) is connected to the first control device (13),  
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- in that two rear control lines (16, 17) are provided for actuating the brake units (11, 12) associated with the rear axle (3), of which at least the first control line (17) is connected to the second control device (18),  
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- in that a brake modulator (20) is provided, which determines an axle braking command for each axle (2, 3) from preset values relating to vehicle movement dynamics,
- 20 - in that an axle modulator (21, 22) is provided for at least one axle (2, 3), which modulator determines a wheel braking command for each wheel (4 to 7) from the associated axle braking command,
- in that a wheel modulator (23 to 26) is provided for each wheel (4 to 7), which modulator  
25 determines an actuating signal from the associated wheel braking command for a brake actuator (27 to 30) of the associated brake unit (9 to 12)- in that the axle modulators (21, 22) are arranged on or near to the respectively associated axle (2, 3),  
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- in that the two front control lines (14, 15) are connected to the front axle modulator (21) associated with the front axle (2) and the two rear control lines (16, 17) are connected to the rear axle modulator (22) associated with the rear axle (3), in that, at least in the case of one of the axles (2, 3), the associated axle modulator (21, 22) is connected via two actuating lines (37  
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to 40) to both the wheel modulators (23 to 26) of both the brake units (9 to 12) of this axle (2, 3),

- in that the two axle control lines (37 to 40) are each connected to only one of the wheel modulators (23 to 26),
- in that the one wheel modulator (23, 25) is connected to the other wheel modulator (24, 26) and transmits the signals, supplied to the one wheel modulator (23, 25) via the one axle control line (37 to 40), to the other wheel modulator (24, 26).

2. The brake control system as claimed in claim 1, characterized in that at least one dynamic system is provided for vehicle stabilization, the wheel-specific components of which are arranged in the axle modulators (21, 22) and the axle-specific and/or vehicle-specific components of which are arranged in the brake modulator (20).

3. The brake control system as claimed in claim 1 or 2, characterized

- in that the wheel modulators (23 to 26) are integrated into the associated brake unit (9 to 12), or
- in that the wheel modulators (23 to 26) associated with the wheels (4 to 7) of the same axle (2, 3) are each integrated into the axle modulator (21, 22) associated with this axle (2, 3), or
- in that the wheel modulators (23 to 26) are integrated into the brake modulator (20).

4. The brake control system as claimed in claim 1 or 3, characterized

- in that the brake modulator (20) is integrated into the first central control device (13), and/or
- in that the axle modulators (21, 22) are each arranged on or near to the associated axle (2, 3).

5. The brake control system as claimed in claim 1, characterized

- in that, in the case of at least one axle (2, 3),  
5 the first control line (14, 17) is connected to the wheel modulator (23, 26) of the one brake unit (9, 12) and the second control line (15, 16) is connected to the wheel modulator (24, 25) of the other brake unit (10, 11),
- 10 - in that, in the case of this axle (2, 3), the one wheel modulator (23, 26) is connected via a coupling line (35, 16) to the other wheel modulator (24, 25) and transmits the signals, supplied to the one wheel modulator (23, 26) via  
15 the one control line (14, 17), to the other wheel modulator (24, 25).

6. The brake control system as claimed in claim 1, characterized in that, in the case of at least one axle  
20 (2, 3), both the control lines (14 to 17) are connected to both the wheel modulators (23 to 26) of both the brake units (9 to 12).

7. The brake control system as claimed in claim 6,  
25 characterized in that the second front control line (15) is connected to the second rear control line (16) and transmits the signals, supplied to the one axle modulator (21, 22) via the respective first control line (14, 17), to the other axle modulator (22, 21).

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8. The brake control system as claimed in claim 1, characterized

- in that the second front control line (15) is connected to the second control device (18)  
35 indirectly via the first rear control line (17) or directly,
- in that the second rear control line (16) is connected to the first control device (13)

indirectly via the first front control line (14)  
or directly.

9. The brake control system as claimed in claim 1,  
5 characterized

- in that the two front control lines (14, 15)  
connect the front axle modulator (21) redundantly  
to the first control device (13) and/or with the  
second control device (18),
- 10 - in that the two rear control lines (16, 17)  
connect the rear axle modulator (22) redundantly  
to the first control device (13) and/or with the  
second control device (18).

15 10. The brake control system as claimed in claim 1,  
characterized

- in that, at least in the case of one of the axles  
(2, 3), the associated axle modulator (21, 22) is  
connected via two axle control lines (37 to 40) to  
20 both the wheel modulators (23 to 26) of both the  
brake units (9 to 12) of this axle (2, 3),
- in that both the axle control lines (37 to 40) are  
connected to both the wheel modulators (23 to 26)  
of this axle (2, 3).

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